MSIAC Munitions Safety Information Analysis Center
Supporting Member Nations in the Enhancement of their Munitions Life Cycle Safety

Bulletin

IN THIS ISSUE

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PATRICK LAMY HAS RETIRED !

FRENCH STEERING COMMITTEE MEMBER & NFPO

Patrick Lamy has retired from DGA, the French MoD, at the end of October. This comes along with his resignation from his position as the Steering Committee Member and NFPO for France, but also from the chair of the Conference of National Armaments Directors (CNAD) Ammunition Safety Group, AC/326. At the last SC meeting, Skip Davis, the Deputy Assistant General for the NATO Defense Investment Division gave a vibrant speech recognizing Patrick's involvement in munitions safety over the decades of his career. Here are the most outstanding extracts from the speech:

About Patrick's involvement in NATO committees:

"***Patrick's involvement in the NATO AC/310 SG/1 began in the early 1980's. He later became the chairman of AC/310 SG/1 in the middle of the 1990s. In 2003, the activities of AC/258 and AC/310 were reorganized and combined to create CNAD Ammunition Safety Group (CASG) AC/326, where he was elected to be the chairman in 2006 and has continued in that role until 2020.***"

"***Under his current role as Chairman of AC/326, he has been responsible for a large portfolio of technical documents that consists of 87 STANAGs, 53 standards, 1 standards related document and 40 documents under study.***"

"***He took key roles in the maintenance and further development of the large CASG standardization dossier, which makes close to 10% of the entire NATO standardization portfolio.***"

About his involvement at NIMIC/MSIAC:

"***Patrick was a key facilitator for the creation of the NATO Insensitive Munitions Information Center (NIMIC), which later became MSIAC, and he has been involved in the management process for the past three decades. Patrick has been the French Steering Committee Representative for MSIAC since 1999, where he has also served as the National Focal Point Officer.***"

And finally about his personal qualities:

"***His long standing leadership role within NATO was due in large part to his outstanding leadership skills, his vision of the direction of NATO and the munitions safety needs of the member nations, his technical expertise, and his***

political knowledge and diplomacy."

Skip concluded the speech by expressing what we will all feel after Patrick's departure: ***"NATO, MSIAC and the international technical community will miss his leadership and support and certainly his warm and friendly personality."***

All the MSIAC staff is now looking forward to properly celebrating the event in Brussels, as soon as the pandemic situation allows travels. As the famous French song says: "Ce n'est qu'un au revoir!" (this is only goodbye).

The MSIAC Team

PM's Perspective

The world entered into the final two months of 2020 much like we started the year... in a COVID-19 lockdown. That said, 2020 will come to an end soon and be remembered as the year of cancelled meetings, conferences, workshops, country visits, and working from home. However, MSIAC was able to successfully adapt to the situation and participate in, and lead, a number of virtual meetings and conferences and continue to deliver products and services in support of its member nations. In 2020, MSIAC welcomed Mr. Chris Hollands to the team as the new Energetic Materials TSO. Ms. Morgan Bolton completed her Stokes Fellow program of work and a technical paper, "Influence of Mechanical Properties on the Explosiveness of Energetic Materials: How Damage Influences Material and Component Response." MSIAC updated the course material for AASTP-1 and -5 to the latest standards, followed by a webinar on the 12th through the 16th of October with 85 participants from 10 MSIAC member nations. MSIAC delivered 12 technical reports, answered 87 technical questions, and continued to support AC/326 technical efforts and updates to STANAGs and AOPs.

It is also important to note that MSIAC is approaching its 3000th technical question, its 300th technical report, and will be celebrating its 30th year in 2021. All are noteworthy milestones and you will be hearing more about that in the coming months as we look for ideas to commemorate these milestones.

As it relates to the MSIAC web applications, 2020 was a busy year:

- We completed the MSIAC Quantity Distance Consequence Analysis Tool (MQDCAT) v2.4, including a software specification report.
- Phase 1 of the implementation of EMC v6.4 was completed and work on phase 2 is underway.
- ARM V2.0 was launched in May which now includes the Modified Jacobs-Roslund (MJR) model.
- Finally, we completed the software specification for SASO v4.0 which will include a MTDS flowchart-based user interface to allow the identification of design and assessment requirements as well as the related standards.

MSIAC and the US Army CCDC Armaments Center (AC) established a CRADA for "Collaborative Jaguar Source Code and Graphic User Interfaces (GUI) Improvements." This CRADA will allow CCDC AC and MSIAC to jointly work on improving the JAGUAR program and will benefit both US DoD warhead designers and MSIAC member countries with the use of a user friendly GUI thermo-chemical modeling tool.

2020 also saw modest growth in new technical areas for MSIAC related to Electromagnetic Environmental Effects (E3) to include Hazards of Electromagnetic Radiation to Ordnance (HERO). MSIAC is providing support to the Military Committee, Maritime Standardization Boards E3 RADHAZ Working Group through the development of the MSTRAD tool. This tool allows for a preliminary development of platform susceptibilities based on specific loadouts of munitions to assist in the management of HERO. Further growth is expected in 2021 to support AC/327 WG/6 related to Life Cycle Environmental Profile (LCEP) testing for munitions in the areas of mechanical, climatic, and electromagnetic environments.

MSIAC held the autumn MSIAC Steering Committee Meeting (virtually), and the two day meeting provided MSIAC the opportunity to present its 2020 technical accomplishments to the Steering Committee and for the Steering Committee to provide direction and approve the 2021 Work Plan.

2021 will introduce a number of new Strategic Goals and Objectives and related efforts. We also have a number of new Work Elements in addition to our ongoing projects and usual activities. These include:

- **Improved Understanding of Shock Initiation Tests.** The aim of this project is develop an improved understanding of shock initiation in current standard and developmental shock sensitivity testing methods. Surprisingly, the initiation of energetics in standardized gap tests is not completely understood and can sometimes be misleading. MSIAC will be supporting the AC/326 Shock Sensitivity Test Methodologies CWG.
- **Effect of Ageing on Energetic Materials and Munitions.** This project will provide a consolidated series of reports dedicated to the effect of ageing on the performance and safety for the following elements: raw materials, GP, polymer bonded EMs, melt-cast and pressed formulations, flares and pyros, munitions and electronics.
- **Energetic Material Qualification.** A number of actions were decided at the MSIAC technical meeting on Energetic Material's Qualification (EMQ) which was held in Bourges in June of 2019. This work element is a follow on to the actions taken by MSIAC to include the development of the EMQ self-audit and the list of mandatory tests for EMQ in a prioritized fashion.
- **Nanomaterials as Energetic Fillers.** This project will include research into the use of "nanoscale" energetic fillers 1 to 100 nm (10^{-9} – 10^{-7} m) for use in energetic material formulations and will deliver a report on the benefits and safety considerations.
- **Statistical Tools for Ammunition Safety and Hazard Analysis.** This project will review the statistical significance of tests (set-back testing, proof testing, and IM fragment impact) and point to current work and tools to use for better recognition of the probability of an event. This also applies to the statistical tools available to aid in the detection of defects (PoD curves).
- **Property Estimations for Energetic Materials.** Here, MSIAC will assess and recommend the appropriate estimation scheme for different physical, transport, and shock properties of energetic materials.
- **Sensitivity Analysis of Life Cycle Costing for Munition Health Monitoring: Case Studies.** MSIAC will explore the information, decisions, and benefits of Monte Carlo simulation in the context of Munition Health Monitoring and the impact on life cycle costs.
- **Advances in Effect and Consequence Models for Explosives Safety Risk Analysis (Stoke Fellow Project).** Models have been developed for prediction of fatalities and injuries due to debris and fragments in line with Debris and Fragment Distances (DFD) in AASTP-1. This project will support further development of state of the art effect and consequence analysis models to include debris hazards from masonry storage structures (Stokes Fellow project) and effect and consequence models

consistent with AASTP-1 QD, and the effort will provide input for the MQDCAT tool.

- **Application of Herd Immunity Theory (HIT) to Munitions Safety.** The introduction of Insensitive Munitions (IM) creates safety benefits due to the reduced vulnerability and munition response in impact and cook-off scenarios. When conventional munitions are replaced by IM this often takes place partially and in phases. This raises the question of what is a critical amount or fraction of IM that will avoid escalation of accident scenarios. This work element will provide insight into the link between HIT and munitions safety, and may provide input to mixing rules in AASTP-1.
- **Novel S3 Approaches.** This project will examine how nations are reducing the timescales and cost of munition qualification programs, including the methods, tools and use of cost benefit analysis tools.
- **Booster Explosives SoA.** In 2006, MSIAC issued report L-119 "A Review of Fuze Booster Compositions for Use in IM Applications." This report identified progress that had been made to that time in the development of new booster compositions, primarily in an effort to replace tetryl which had previously been the ubiquitous booster explosive. Recently, MSIAC answered a technical question on the hazard properties of booster explosives and their contribution to munition level response. An update and expansion of L-119 would appear to be timely and of interest to the MSIAC community.

As always, I would like to encourage you to get involved in our program of work during 2021 and the MSIAC staff is hopeful for the resumption of normal activities in the hopes of seeing you soon. Please feel free to send us an e-mail requesting more information or to be kept informed or involved on any of our work elements.

Chuck Denham
Project Manager

MSIAC Workshop on DEFECTS

Causes, Classification and Criticality
Virtual Plenary session

As we move towards the end of the year, the various restrictions put in place during the pandemic are continuing to make international travel for business purposes difficult. With the Defects Workshop planned to take place just 8 weeks into the start of the new year, in September we made the difficult decision to cancel the in-person element of the meeting that was due to take place in The Hague.

However, we are pleased to announce that the plenary session of the MSIAC Defects Workshop will now take place as a virtual meeting from **9th to the 11th March 2021**, using the GoToMeeting platform.

In consideration of the different time zones of our member nations, presentations will be delivered from 1400 to 1800 CET each day. Registration and abstract submission is now open; as before, topics of interest include origin, detection, consequences and criticality of defects in energetic materials and munitions.

For more information, registration and abstract submission please visit: https://www.msiac.nato.int/defects.

We look forward to seeing you at the virtual plenary session in March 2021!

Matt Ferran
Munition Systems TSO

MSIAC
Munition Safety Awards

To acknowledge and encourage progress and achievements in munitions safety and insensitive munitions technology, MSIAC has presented awards for munition safety excellence at the NDIA IM/EM Technology Symposium (IMEMTS) since 1997. The full list of nominees is available on the MSIAC website: https://www.msiac.nato.int/news/ms-awards.

Once again MSIAC will be presenting awards at the upcoming **2021 virtual IMEMTS** in the categories of **Technical Achievement** and **Career Achievement**, and nominations are now open. The deadline for nominations is **11th December 2020**. All nominations will be reviewed and winners selected by the MSIAC Steering Committee, made up of government representatives from each member nation.

To make a nomination please visit the MSIAC website, where you can find further details of criteria and the required format for nominations: https://www.msiac.nato.int/ms-awards-2021.

Christelle Collet
Propulsion Technology TSO

You can find all Technical PUBLICATIONS via this hyperlink .

Welcome Chris Hollands

Chris joined MSIAC on August 3rd, 2020 as the Technical Specialist Officer for Energetic Materials, coming from the Defence Ordnance Safety Group (DOSG), UK Ministry of Defence. He has a Masters degree in Chemistry from the University of Birmingham which he obtained in 2007. Following graduation, and after spending 2 years as a research scientist in polymer chemistry, Chris joined the UK MOD graduate science and engineering scheme in 2009. In 2011, he joined the Defence Ordnance Safety Group as an energetic material scientist. Here Chris provided expert scientific advice on the testing of energetic materials to assess both their suitability for entry into service and through life assessment.

Over his 11 years within the UK Ministry of Defence, Chris worked within the ordnance munitions and explosives sector across land, sea, and air domains, working on a variety of systems including large calibre artillery, naval surface to air missiles, torpedoes as well as a multitude of smaller natures. Additionally, Chris worked very closely with a number of UK and international industrial manufacturers on the production of raw energetic materials / formulations and munitions.

In 2018, Chris assumed the role of UK National Authority for Qualification, ensuring that new energetic materials introduced into UK service met the required standards for safety while maintaining their performance requirements.

Having worked closely with MSIAC through his career within the UK Ministry of Defence, Chris was keen to take the opportunity to join MSIAC when the position for the TSO Energetic Materials became available. Chris looks forward to using his experience in energetic chemistry and its applications in fielded systems to help the MSIAC member nations with energetic materials queries.

New Opportunities for MSIAC Internship in 2021

MSIAC has opportunities for member nation's personnel who have completed or are completing a technical degree related to munitions engineering and safety and the intention to enter government or industry. For people in-between years at university or engineering school, placements can be for 8 weeks or for people completing a technical degree or Masters level degree, for longer periods.

Due to the uncertainty related to the current COVID situation, it is not possible to guarantee that the 2021 internships will be conducted in the MSIAC office, in Brussels, as has been the practice. We have thus decided to turn this constraint into an opportunity for the students to conduct their internship remotely. This may especially benefit students coming from distant MSIAC nations, such as US, Canada, Republic of Korea and Australia, who generally cannot afford to travel to Brussels.

In any case, a **NATO Secret clearance** is mandatory in order to be granted access to the MSIAC office and to the MSIAC IT environment. To allow time for processing, applications for internships must be submitted at least six months prior to the expected internship time frame.

The updated list of students' projects for 2021 and all the information to apply can be found on the MSIAC public website here: https://www.msiac.nato.int/products-services/msiac-interns-trainees.

Christelle Collet
Propulsion Technology TSO

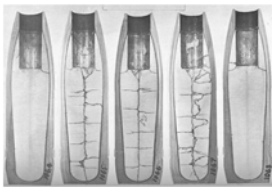
Gun Launch Setback Ignition Study WG

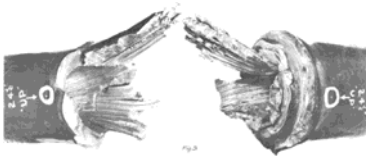
The Gun Launch Setback Ignition Study Working Group was initiated by the NATO AC/326 SG/A – Energetic Materials and is being led by the USA, with Sean Swaszek from US Army CCDC-Armaments Center overseeing the process. The goal of the working group is to develop a new STANREC and AOP - Suitability of Energetic Material Survivability under Setback Loading for standardizing the approach to testing and evaluating the safety of energetic materials and munitions to setback loading. Dr. Ernie Baker from MSIAC has been providing technical support to the group.

MSIAC has an associated work element that has developed a lexicon of terms for munitions defects, including gun launched projectiles. There is an associated planned workshop, Defects – Causes, Classification and Criticality, to be held virtually in March of 2021. Please see the related announcement in this newsletter.

Dr. Baker has recently researched historical artillery prematures and TNT exudation. The associated MSIAC reports are available: O218 - Artillery Projectile Premature Historical Review and L261 - TNT Exudation, Crystal Growth and Ageing.

The 5th Gun Launch Setback Ignition Study Working Group (WG) was held virtually on 9-10 November 2020. NATO country SMEs participation was encouraged, particularly with expertise in gun launch munition dynamics (acceleration and acceleration perturbations).





Dr Ernie Baker
Warheads
Technology TSO

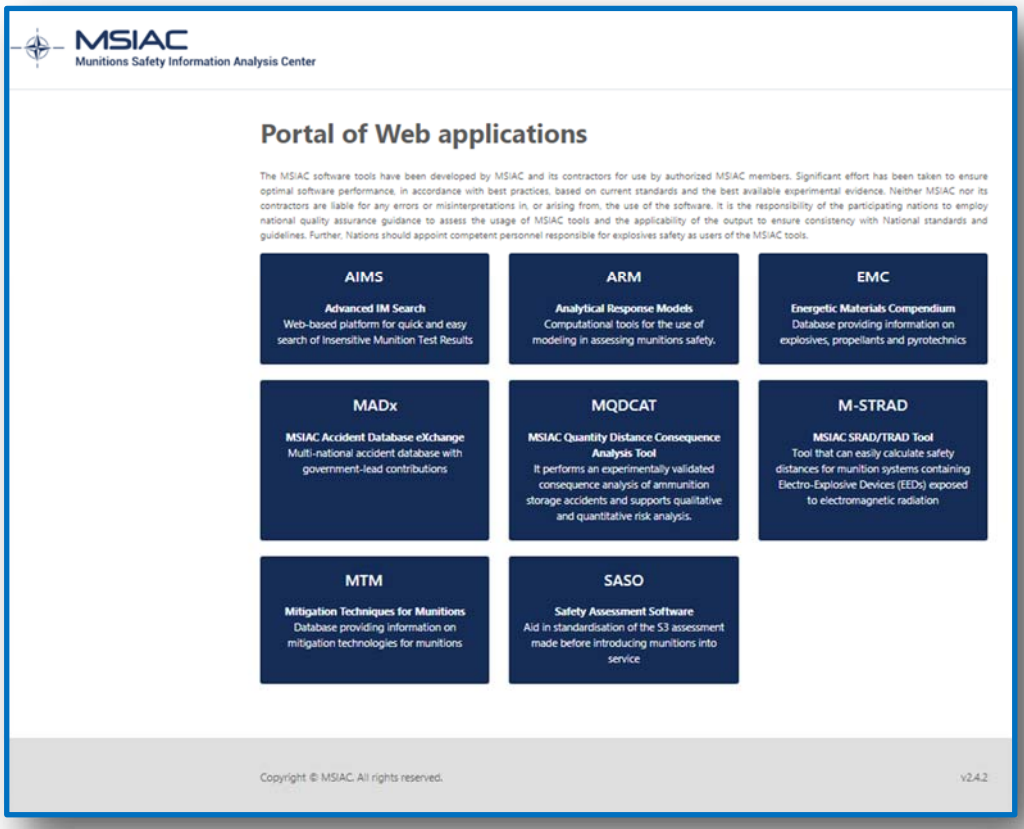
Check out the updated reported ACCIDENTS** via this **hyperlink** **and our series of ACCIDENT POSTERS on our website.

A New Design for the MSIAC Portal

For those of you who are familiar with the MSIAC portal from where you can access all the MSIAC online tools, you may have noticed a significant change in the design:

Before:

After:



In addition of being consistent with the new MSIAC graphical chart, the new portal design includes a couple of significant changes that you might be aware of:

- The addition of a legal disclaimer at the top of the page. We invite you to thoroughly read it and make sure you agree with it before using any MSIAC tool;
- The removal of the Weblink icon (to access the online database of MSIAC documents, please go here: https://weblink.msiac.nato.int/weblink/Browse.aspx?cr=1);
- The removal of the Forum icon: the link was inactive and nobody remembered what this was for!

We hope you will enjoy this new design and please do not hesitate to let us know should you have any ideas to improve our website. We will be more than happy to take them into consideration.

Christelle Collet
Propulsion Technology TSO

AC/326 SG/B Activities

Although it has not been possible for AC/326 SG/B to meet in person this year, nonetheless a great deal of work has been achieved through various virtual meetings.

AOP-15 Custodial Working Group

In October 2020, a virtual Custodial Working Group (CWG) was held to kick-off the update process for AOP-15 (*Guidance on the Assessment of the Safety and Suitability for Service of Non-nuclear Munitions for NATO Armed Forces*), currently at Edition 3 dated April 2009.

Over 40 participants from 10 nations joined the discussion, with representatives from each nation providing a presentation on their S3 assessment policies and procedures. Preliminary milestones for the update process were discussed, informed by the output of an online survey held earlier in the year.

The importance of this standard to the member nations was evident from the enthusiastic participation of the delegates and it was agreed to hold a follow-on meeting in December, so as to maintain momentum before the next in-person meeting.

Insensitive Munitions / Hazard Classification Harmonisation Custodial Working Group

Also held in October 2020, this virtual CWG discussed the efforts to harmonise Insensitive Munitions and Hazard Classification testing and assessment. About 30 participant attended from 10 nations.

The short term goal of the CWG was confirmed as being the establishment of a baseline level of harmonisation based on existing full scale testing and assessment procedures. In order to achieve this goal, an update of both STANAG 4439 / AOP-39 and STANAG 4123 / AASTP-03 is required.

The majority of the meeting was dedicated to a line review of a proposed new draft of AOP-39, with some changes made to the way in which IM threat levels are described so as to align with recent changes to the six full-scale IM test AOPs which have recently been published. This review will be completed in a follow-on meeting in December.

Full Scale IM Test AOP Review Working Group

Since April 2020, a small group of SG/B members have been meeting fortnightly to review the six full-scale IM test AOPs, and to propose formatting and layout changes so as to present all six AOPs in a consistent manner. The intent is to make the full suite of AOPs easier to relate to each other, where equivalent or diverging requirements for each test type can easily be identified. Importantly, no technical content will be changed.

The group has recently completed their review of the sixth and final AOP, and will soon begin a review of SRD AOP-39.1.

Matt Ferran
Munition Systems TSO

Do you want to know what's going on in AC/326 and its SUB-GROUPS? Check it out here!

2020 Virtual Special Operations Forces Industry Conference (vSOFIC)

E. Baker represented MSIAC at the 2020 vSOFIC, held 11 -15 May 2020. The annual NDIA SOFIC Conference was held as a virtual meeting due to COVID-19 restrictions. The vast majority of attendees were from the USA. The conference included a number of presentations on special forces technology and capability development and requirements. Of particular interest was the presentation by the Program Executive Office Special Operational Forces Warrior (PEO-SW) by COL J. Babbit. The PEO SOF Warrior (PEO-SW) is a joint staffed, multidiscipline organization chartered to provide state-of-the-art combat capabilities to the USA SOF. The conference worked directly in-browser with no additional software required. The next SOFIC 2021 is planned for 17-20 May, Tampa, FL, USA.

Dr Ernie Baker
Warheads Technology TSO

15TH (WEB) Workshop on Pyrotechnic Combustion Mechanisms

Christelle Collet attended the web workshop on pyrotechnics combustion mechanisms on 5-6-7 October. This workshop was co-initiated in 2004 by Ernst-Christian Koch (former Energetic Materials TSO, now business owner of Lutradyn, Germany) who continues to chair it. The only difference with the previous editions is that, this time, it was held virtually. It was spread over three days, from 4:00 to 6:45 CEST. Between 40 and 45 people attended the workshop each day.

The agenda included a total of six long presentations (40 to 60 minutes each), with two presentations each day and 10 to 15 minutes after each presentation dedicated to questions and discussions:

- On 5th October, Prof. Dr. Edward Dreizin (NJIT, Newark, NJ, USA) presented on "Metal-Metal Fluoride Reactive Composites and Reactions Leading to their Ignition" and Prof. Dr. Michelle Pantoya (TTU, Lubbock, TX, USA) presented on "Ignition Mechanisms for Fuel Particles in Energetic Composites";
- On 6th October, Prof. Dr. Steven Son (Purdue, West Lafayette, IN, USA) presented on "Impact Ignition of Energetic Materials" and Prof. Dr. Jan Puszynski (IMP, Rapid City, SD, USA) presented on "Ignition of Energetic Materials: Mechanism, Theory and Modeling";
- On 7th October, Dipl.-Ing. Volker Weiser (FhG-ICT, Karlsruhe, BW, DEU) presented on "Experimental Investigation and Modelling of the Ignitor Plume/ Propellant Interaction" and the final presentation was given by Prof. Dr. Bill Proud (Imperial College, London, UK) on "Impulsive Loading of Detonation Trains".

The topics covered during this web-workshop were of particular interest for MSIAC activities and for the MSIAC community: ignition mechanisms, pyrotechnics, kinetic models, and processing techniques. The fact that it was organized as a web-workshop encouraged MSIAC staff to attend this edition although this event has not been systematically attended by MSIAC staff in the past.

Christelle Collet
Propulsion Technology TSO

MSIAC QD Consequence Analysis Tool

In the previous newsletter we briefed about the work in progress related to the MSIAC Quantity Distance Consequence Analysis Tool (MQDCAT). In the meantime, MQDCAT is available on the MSIAC secure website, as well as a detailed report with a description of the implemented models (MSIAC report L-252).

MQDCAT performs an experimentally validated consequence analysis of the initiation of various types and quantities of munitions in various types of magazines and with possible mitigation measures in place. It gives insight into the consequences that are to be expected when QD cannot be met, and provides input for both qualitative and quantitative risk analysis. MQDCAT is consistent with the QD in the next version of AASTP-1 (EdC V1) for all Hazard Divisions (HD) and over the full range of NEQ.

A major addition is the ability to calculate the probable number of fatalities and injuries in a number of Exposed Site types. This is based on a detailed analysis of blast, fragment, debris and thermal hazards observed in available tests. As you can see below, some of the MSIAC staff have volunteered to take part to test the software.

	ES Name	ES Type	Distance (m)	People in ES	Fatalities	Injuries
1	Chuck	Hardened Structure	80	100	0.00	0.00
2	Ernie	Inhabited Building	200	100	20.72	9.68
3	Chris	Inhabited Building	300	100	11.51	8.97
4	Christelle	Open	350	100	27.93	35.55
5	Matt	Open	400	100	13.56	17.26
6	Kevin	Inhabited Building	450	100	1.32	2.26
7	Martijn	Open	700	100	0.18	0.23

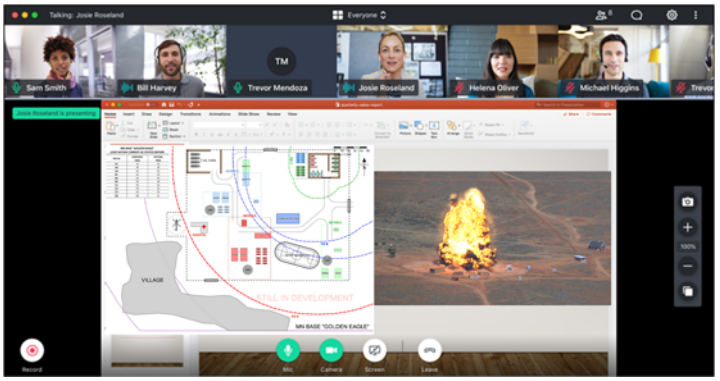
We invite you to test the software and provide us feedback about user experience and technical content. We have already received various comments and we will take these into account for the next update of the tool.

Martijn van der Voort
TSO Ammunition Transport and Storage Safety

MSIAC Courses

In the previous newsletter, we announced a webinar version of the AASTP-1 and AASTP-5 lecture series in order to cope with the current Covid-19 situation.

The preparation of this webinar included the update of the course material with the most recent versions of the NATO standards. Together with Johnny de Roos and Eric Deschambault, the webinar was conducted from 12 to 16 October, with a very good attendance of 85 participants from 10 MSIAC member nations. In order to have acceptable meeting times for the different time zones, the agenda was limited to 4 hours per day. For some this meant lectures during an early breakfast, for others during an evening snack!



Our gotomeeting was used to drive the meeting, while the Slido application was used for quizzes and feedback. Unfortunately the large group exercises that are normally conducted had to be cancelled. The gotomeeting chat functionality proved to be an efficient way to collect questions, and to discuss a number of topics with the community, e.g. about cell phones and munitions, barricade rules, NEQ and TNT equivalency, equivalency of building materials, criteria for underground power and communication lines, as well as ports criteria.

The updated course material will be used to develop a manual for the application of QD criteria according to the new AASTP-1 EdC V1. This manual will be releasable to NATO AC/326 SGC and is expected next year.
The feedback from the webinar was positive, and led to the plan to conduct the following courses as webinars:

- Erfurt, Germany (9-13 November 2020)
- Brussels, Belgium (30 November – 4 December 2020)

For next year we have received the following interests for the AASTP-1 and AASTP-5 course. It is still to be determined whether these will be in webinar format or physical events.

- CFB Borden, Canada (22-26 February)
- Versailles, France (8-12 March)
- Germany (TBD)
- Poland (TBD)
- Belgium (TBD)

Also in the next year we are planning to deliver an ESMRM course at Picatinny Arsenal, USA (18-20 May). Please get in touch if you are interested to attend any of our courses. We hope to have more concrete information in our next newsletter.

Martijn van der Voort
TSO Ammunition Transport and Storage Safety

In Memoriam

It is with great sadness that we report the death of **Michel Thévenin** who died on the 19th of October 2020 at 87 years old.

At the NATO AC/310 "Workshop on Insensitive Munitions Information Exchange" (1986) which led to the establishment of Pilot NIMIC, Michel Thévenin (then Chairman of AC/310), together with Dr. R.L. Derr (then Principal US Member of AC/310), identified the objectives and activities of AC/310 and proposed the establishment of Pilot NIMIC.

Thanks to his strong knowledge and experience in energetic materials and munitions acquired during his service at DGA and his time as chair of NATO AC/310 from 1983 to 1987, Michel Thévenin was the clear choice for succeeding Marc Defourneaux in 1995 as the NIMIC project manager (PM). During his mandate, Michel Thévenin actively contributed to promote MURAT (MUnitions à Risques ATténuées, meaning Insensitive Munitions in French) across the world and in Europe. In this frame, he was appointed by "Club MURAT" to establish the initial contacts with the European industrial companies working in the field which paved the way to the creation of the IMEMG network as we know it today.

Michel Thévenin, Ed Daugherty, and Ron Derr were known as "les trois Mousquetaires" (the three musketeers in English, from a famous 19th century novel of the French Author Alexandre Dumas) due to their strong friendship and the determining role they played in the creation and management of NIMIC. Michel Thévenin retired in 1998 after his time as the NIMIC PM. During his retirement, he continued to closely monitor the news related to NIMIC, which then became MSIAC, and the "muratisation" of munitions.

Peter Lee (left) succeeding Michel Thévenin (right) as the NIMIC PM in 1998.

Our sincere condolences go to his six children and family.

The French Chronicle – Considerations Related to the Pandemic

In these troubled times, where the news overwhelms us with more and more depressing information about the COVID-19 pandemic, I propose to you to step back for a while and to think about pandemic-related words. Let's take the word "quarantine", for instance. It is quite obvious for a Latin-derived language speaker where it comes from, but it may not be clear for English speakers. Just because the numbers don't have the same etymological root: quarantine comes indeed from the Italian number "quaranta" (= forty in English; quarante in French, cuarenta in Spanish). It corresponds to the number of days the sailors had to stay isolated onboard a ship before being authorized to set foot on land. This "quaranta" was first initiated by Italy in the 14th century at the time when the black plague raged, and forty days was considered the maximum time for plague symptoms to develop. For those who are lucky not to be in quarantine, there might well be other restrictions such as a curfew. So before I end this chronicle, let me just tell you more about the word "curfew". It comes from Old French "cuevrefeu", literally "cover fire" (= "couvre-feu" in Modern French), meaning that all fires and lamps had to be extinguished before going to bed. And when pronounced rapidly with an English accent it gives "curfew". There you are. Take care, stay safe, and be patient until the time when more cheerful words will inspire this chronicle!

Christelle Collet
Propulsion Technology TSO